Meeting/Workshop Reports

HESSS-2 International Conference

22–25 June 2010
University of Tokyo, Japan

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During the First International Conference on Hydrology delivers Earth System Science to Society (HESSS-1) in 2007, an attempt was made to ascertain the gaps between the needs of society and the services of the hydrology community. In particular, the estimation and reduction of uncertainty in simulations were identified as key leverage points along with an appropriate use of observational data sets in validation and data assimilation. The success of the first conference laid out the basis for the 2nd HESSS International Conference, which was hosted at the University of Tokyo in June 2010. The meeting brought together four unique communities—the Global Soil Wetness Project (GSWP)/Global Land/Atmosphere System Study (GLASS); the AsiaFlux/Flux Tower Network (FluxNet); LandFlux-Eval; and the GEWEX Hydroclimatology Panel (formerly CEOP)—to bridge the aforementioned gaps and address the key leverage points with a shared vision of a sustainable and desirable world.

The meeting brought together more than 140 researchers and students from 12 countries and included a great mix of oral (82) and poster (33) presentations in 24 sessions. The main objective of the conference was to establish practical protocols and frameworks to promote more effective collaboration among the research communities of hydrological modeling, field observations, and remote sensing in the context of sustainability science. As a true test bed for community level collaboration, new frameworks similar to the Global Soil Wetness Project-3 (GSWP-3) and HydroEastAsia will be launched as the outcome of the Conference. In particular, a follow-up to the GSWP-3 initiative was proposed for further development called the Coupled Hydro-Energy-Eco System Experiment (CHEESE). Furthermore, a special issue of the *Journal of Hydrometeorology* (Guest editors: S. I. Seneviratne, T. Oki, J. Kim, and H. Kim) is in preparation and will include a selection of papers from HESSS-2.

Participants at the HESSS-2 International Conference.

GCSS Workshop on Microphysics and Polar/Precipitating Clouds

24–25 June 2010
University of Washington, Seattle, WA, USA

Chris Bretherton[1], Ann Fridlind[2], Hugh Morrison[3], and Ben Shipway[4]

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Thirty-five scientists from three GEWEX Cloud System Study (GCSS) Working Groups (WGs) attended the Workshop to discuss their current studies and plans for improving understanding of the coupled cloud microphysical and dynamical processes based on their relevance to improving the parameterizations in large-scale weather/climate models.

The Polar Cloud WG (*http://www.ral.ucar.edu/projects/GCSS/WG5/*) has been focusing on Arctic mixed phase clouds and presented results from a recent intercomparison case that used Surface Heat Budget of the Arctic Ocean (SHEBA) Project data for a shallow radiation-driven, cloud-topped mixed layer cloud (temperatures around –20°C) with a mix of super cooled droplets and crystals (growing mostly by water vapor deposition with very light precipitation). Due to the poor understanding of the different modes of ice nucleation, the ice crystal concentration was specified in the models. The six participating large eddy simulation (LES) and cloud-resolving models (CRMs) showed sensitivity to changes in the specified crystal concentration (within the range of observational plausibility). They also exhibited sudden transition from sustained mixed-phase clouds at low crystal concentration, to rapid glaciation, to all-ice clouds within the first hour at slightly higher crystal concentrations (see Figure 1 on page 18). These sudden transitions present parameterization challenges and need to be further investigated. Even in the presence of relatively large concentrations of ice nuclei above the cloud layer, the rapid depletion of ice crystals within the layer can lead to much lower concentrations, which may help to sustain the mixed-phase cloud layer.

Overall, the results presented reinforced the need to improve the understanding of the factors controlling ice nucleation and crystal concentration. The next Polar Cloud WG intercomparison (to be led by Mikhail Ovchinnikov, Pacific Northwest National Laboratory) will be based on a similar case using data from the Indirect and Semi-Direct Aerosol Campaign (ISDAC), where crystal aggregation and precipitation is more important.

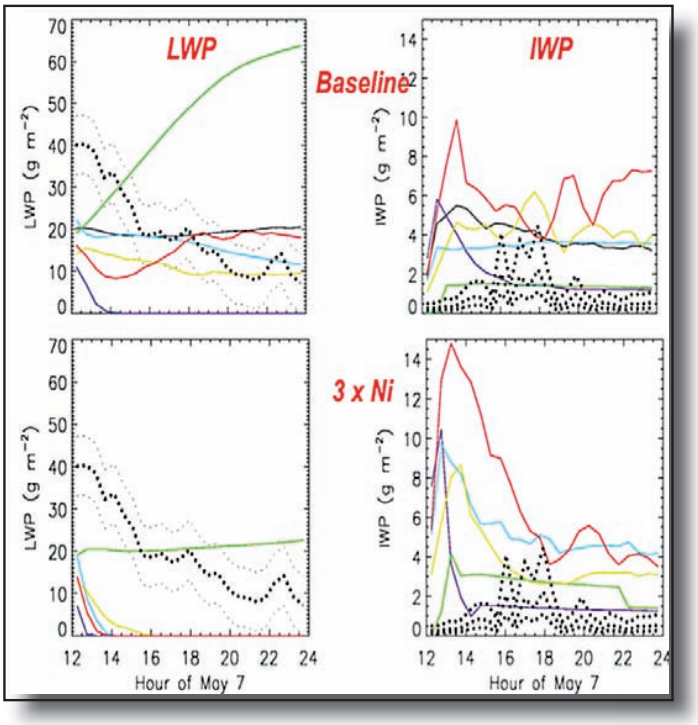

Figure 1 (left). Model runs for liquid water path (LWP; left panels) and ice water path (IWP; right panels) for the baseline (top panels), and three times the ice number concentration (bottom panels). Color lines show results from the different models and dashed lines show observations from ground-based remote sensors. With best-guess baseline ice crystal concentrations, three out of four models maintain a super cooled liquid cloud layer comparable to that observed. With the ice crystal concentration tripled (3xNi), all but one model quickly glaciates away the cloud layer, highlighting a strong sensitivity of cloud microphysics to ice crystal concentration.

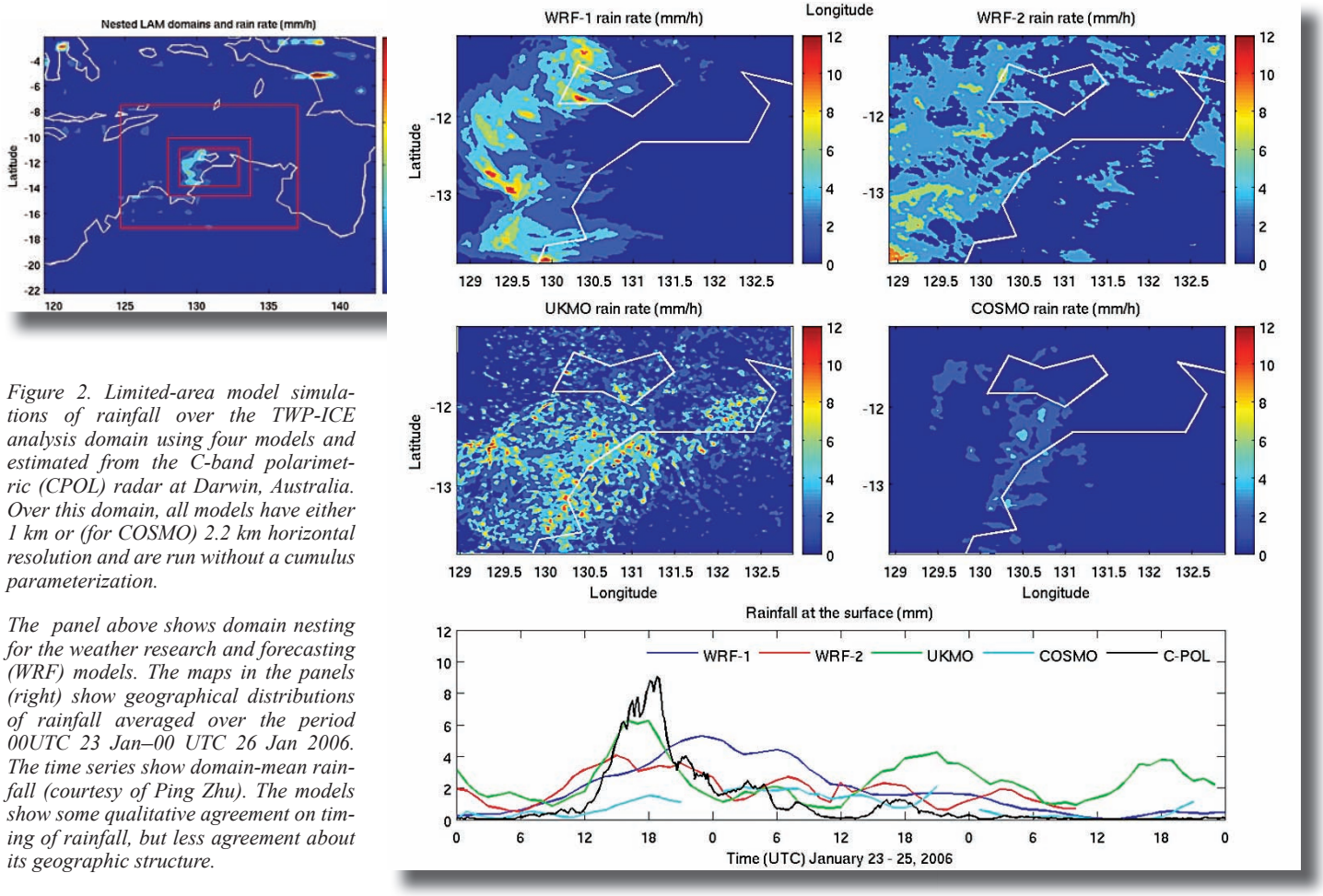

Figure 2. Limited-area model simulations of rainfall over the TWP-ICE analysis domain using four models and estimated from the C-band polarimetric (CPOL) radar at Darwin, Australia. Over this domain, all models have either 1 km or (for COSMO) 2.2 km horizontal resolution and are run without a cumulus parameterization.

The panel above shows domain nesting for the weather research and forecasting (WRF) models. The maps in the panels (right) show geographical distributions of rainfall averaged over the period 00UTC 23 Jan–00 UTC 26 Jan 2006. The time series show domain-mean rainfall (courtesy of Ping Zhu). The models show some qualitative agreement on timing of rainfall, but less agreement about its geographic structure.

Presentations by the Microphysics WG (*http://www.iac.ethz.ch/groups/lohmann/ext_projects/GCSS*) focused on using the Kinematic Driver for microphysics intercomparison (KiD), a freely available software developed by Ben Shipway and his coworkers at the UK Met Office (UKMO). The KiD is used for comparing and testing bulk and bin microphysics representations in a column setting with prescribed initial conditions and time-dependent vertical motion profiles. It was shown how a test case idealized from diverse cloud regimes could be effectively used to improve warm-rain auto conversion and collection parameterizations in bulk microphysical schemes to better agree with nominally more accurate bin-resolved schemes.

The Microphysics WG, led by Ben Shipway, plans to use the KiD as a platform for a GCSS microphysics intercomparison using a wave-cloud case from the Ice in Clouds Experiment-Layer (ICE-L) clouds experiment. The KiD is also suitable for developing new test cases that might complement complete dynamically coupled intercomparison cases by other GCSS groups. Adrian Hill, UKMO, volunteered to lead an intercomparison of the sensitivity of warm-rain production to microphysical representation, cloud depth, droplet concentration, and vertical velocity using an "eddy-pair" approach.

The current focus of the Precipitating Cloud Systems WG (*http://www.convection.info/*) is the Tropical Warm Pool-International Cloud Experiment (TWP-ICE). Key case objectives include a quantitative understanding of the development and maintenance of tropical anvil cirrus and the role of land-ocean contrast in the observed convection during active and less active phases of the Australian monsoon. Cloud-resolving and single-column models have been run on a master case that uses large-scale advective forcings averaged over a region including both land and ocean centered on Darwin, Australia. Case leader Ann Fridlind, Goddard Institute of Space Studies, reported that the domain averaged ice water path (a metric for upper-tropospheric clouds) ranged widely between models, with only two-dimensional models being within observational estimates. Three-dimensional models consistently overestimated ice water path by roughly a factor of two when compared with two independent retrievals, which may be related to a factor of two to three overestimates of convective area coverage when compared with scanning precipitation radar data.

Limited area models (LAMs) with a cloud-resolving inner grid nested inside a coarser model forced at its boundaries by global analyses (case leader: Ping Zhu, Florida International University) showed some skill in capturing the evolution of monsoonal convection over this region, as well as land-ocean contrast in convective development. The case highlights the challenges for simulation of individual tropical rainfall events using these models (see Figure 2 on page 18). The outer model in which the LAM is embedded is a critical factor in rainfall simulation. Case leaders are planning to publish results within the next year in coordination with related single-column model and general circulation model numerical weather prediction studies led by Laura Davies, Monash University, and Yanluan Lin, Geophysical Fluid Dynamics Laboratory.

GEWEX/WCRP Calendar

For the complete listing, see the GEWEX web site: http://www.gewex.org

23 January 2011—WCRP Chairs and Directors Meeting—Seattle, Washington, USA.

23–27 January 2011—AMS Annual Meeting—Seattle, Washington, USA.

2–5 February 2011—SPARC Scientific Steering Group Meeting—Pune, India.

2–4 March 2011—WCRP Workshop on Drought Predictability and Prediction in a Changing Climate—Barcelona, Spain.

8–10 March 2011—GEWEX/ESA DUE GlobVapour Workshop on Long Term Water Vapour Data Sets and Their Quality Assessment—ESRIN, Frascati, Italy.

22–25 March 2011—Sentinel Scientific Products for Land, Ocean and Cryosphere: Assessment and Consolidation Workshop—ESRIN, Frascati, Italy.

4–8 April 2011—WCRP Joint Scientific Committee Session—UK Met Office/Hadley Centre, UK.

11–13 April 2011—EUMETSAT/ESA Scatterometer Science Conference 2011—Darmstadt, Germany.

16–18 May 2011—YOTC International Science Symposium, Beijing, China.

16 May–3 June 2011—WMO Congress XVI—Geneva, Switzerland.

28 June–7 July 2011—IUGG XXV General Assembly—Earth on the Edge: Science for a Sustainable Planet—Melbourne, Australia.

1–5 August 2011—IGARSS 2011—Sendai, Japan.

30 August–10 September 2011—5th SOLAS Summer School—Corsica, France.

30 August–2 September 2011—GEWEX Radiation Panel (GRP) Meeting—Tokyo, Japan.

18–23 September 2011—3rd iLEAPS International Science Conference—Garmisch-Partenkirchen, Germany.

25–29 September 2011—International Water Resources Association's World Water Congress—Porto de Galinhas/PE, Brazil.